

Atty. Dkt. No. 039153-0223 (E0554)

REMARKS

Applicant respectfully requests reconsideration of the present application in view of the foregoing amendments and in view of the reasons which follow.

Claims 18, 21-25 and 28-37 stand rejected.

Claims 19 and 25 are currently being amended. Claim 25 is amended to correct typographical errors. No new matter is added. The amendment to claim 25 is non-limiting and is not made to overcome prior art. No new matter is added in the amendment to claim 19.

This amendment adds, changes and/or deletes claims in this application. A detailed listing of all claims that are, or were, in the application, irrespective of whether the claim(s) remain under examination in the application, are presented, with an appropriate defined status identifier.

After amending the claims as set forth above, claims 18-37 remain pending in this application.

As a preliminary matter, on page 4, the Examiner indicated that claims 19, 20, 26 and 27 are objected to as being dependent upon a rejected base claim. Claim 19 has been amended to be in independent form. Accordingly, it is respectfully submitted that claim 19 is allowable.

On page 2 of the Office Action, claims 18, 21-25 and 28-37 are rejected under 35 U.S.C. § 103 as being unpatentable over U.S. Patent No. 5,677,224 (Kadosh) in view of U.S. Patent No. 5,625,216 (Miller). The Examiner states:

Kadosh et al shows (fig. 1U) a semiconductor device including a plurality of field effect transistors, each transistor comprising a gate (130) over a channel and a deep source (206) and drain (198) region doped with dopants of a first conductivity type (P). source (204) and drain (152) extension regions are integral with the deep source and drain regions respectively. The source extension is more heavily doped (P+) than the drain extension

Atty. Dkt. No. 039153-0223 (E0554)

(P-). Kadosh discloses that the source extension is deeper than the drain extension such that the device has a low source-drain series resistance and reduced hot carrier effects but does not disclose the drain extension being deeper than the source extension. Miller shows (fig. 6) a semiconductor device having a deep drain region (27) and a source region (29). The device includes source extension (underdiffusion region U_s) and a drain extension (underdiffusion region U_d) integral with the source and deep drain regions respectively. The drain extension is more than 80nm deep (col. 3, lines 15-19). The deeper drain extension provides an increased gate-drain capacitance (col. 3, lines 15-19). The deeper drain extension provides an increased gate-drain capacitance (col. 3, lines 57-62) or vice versa (col. 4, lines 39-42). With respect to the limitations of the claims concerning the concentration of the dopants, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the dopants at a specific depth and concentration, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the asymmetrical source/drain configuration of Kadosh by forming a drain extension deeper than a source extension as taught by Miller to increase the gate-drain capacitance.

Applicant respectfully traverses the rejection. Kadosh and Miller are referred to below as the cited art.

The comments below are directed to claims 18 and 20-37. As discussed in the Appeal Brief filed October 23, 2002, each of independent claims 18, 21 and 31 recite a feature related to a drain extension and a source extension in which the drain extension is deeper than the source extension. The shallower source extension with respect to the drain extension achieve at least three beneficial effects:

- 1) Substantial immunity to short channel effects;
- 2) reduced peak electric field in the channel region reduces the possibility of hot-carrier injection into the gate oxide; and
- 3) higher drive current.

Atty. Dkt. No. 039153-0223 (E0554)

See present application, page 3, lines 1-10. Claims 18 and 20-37 are patentable over the cited art because there is no suggestion for the drain extension being deeper than the source extension, because one of ordinary skill in the art would not achieve the present invention following the combination of Miller and Kadosh, and because Kadosh teaches away from the present application.

First, the deeper drain extension feature is not shown, described or suggested in the cited art. The Examiner admits Kadosh discloses that the source extension is deeper than the drain extension, precisely the opposite structure to that recited in independent claims 18, 21 and 31. Therefore, Kadosh cannot suggest a deeper drain extension because Kadosh has a deeper source extension.

To overcome this deficiency, the Examiner relies upon Miller. However, Miller does not provide any discussion of a source extension or a drain extension. Indeed, Miller merely describes sources 29 and drain 27 which are each comprised of a single doped region. Accordingly, Miller cannot provide a suggestion for a deeper drain extension because it does not mention a drain extension at all. Applicant notes that Miller does not even include a discussion of spacers used in conventional extension implant processes.

Second, even if Miller and Kadosh could be properly combined, the combination of the cited art would not achieve the present application. Indeed, combining the teachings of Kadosh and Miller would result in a deep drain region, deeper than the deep source region of Kadosh. Combining the concepts of Kadosh and Miller would merely cause region 198 of Kadosh to be increased in depth beyond the depth of region 206. A deeper drain extension would not be contemplated by one of ordinary skill in the art reviewing Kadosh and Miller.

Third, Kadosh teaches away from the drain extension being deeper than the source extension. As discussed in detail in the Appeal Brief mailed October 23, 2002, Kadosh teaches precisely the opposite structure to that of the present application. Teaching away from the claimed invention is strong evidence of non-obviousness. Accordingly, claim 18 and its dependent claim 20, independent claim 21 and its dependent claims 22-30 and independent claim 31 and its dependent claims 32-36 are patentable over the cited art.

Atty. Dkt. No. 039153-0223 (E0554)

Applicant believes that the present application is now in condition for allowance.
Favorable reconsideration of the application as amended is respectfully requested.

The Examiner is invited to contact the undersigned by telephone if it is felt that a
telephone interview would advance the prosecution of the present application.

The Commissioner is hereby authorized to charge any additional fees which may be
required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment,
to Deposit Account No. 06-1447. Should no proper payment be enclosed herewith, as by a
check being in the wrong amount, unsigned, post-dated, otherwise improper or informal or
even entirely missing, the Commissioner is authorized to charge the unpaid amount to
Deposit Account No. 06-1447.

Applicant hereby petitions for such extension under 37 C.F.R. §1.136 and authorizes
payment of any such extensions fees to Deposit Account No. 06-1447.

Respectfully submitted,

Date 5-5-03By Joseph N. Ziebert

FOLEY & LARDNER
Customer Number: 26371



26371

PATENT TRADEMARK OFFICE

Telephone: (414) 297-5768

Facsimile: (414) 297-4900

Joseph N. Ziebert
Attorney for Applicant
Registration No. 35,421

FAX RECEIVED

MAY 05 2003

TECHNOLOGY CENTER 2800